FIG. 1

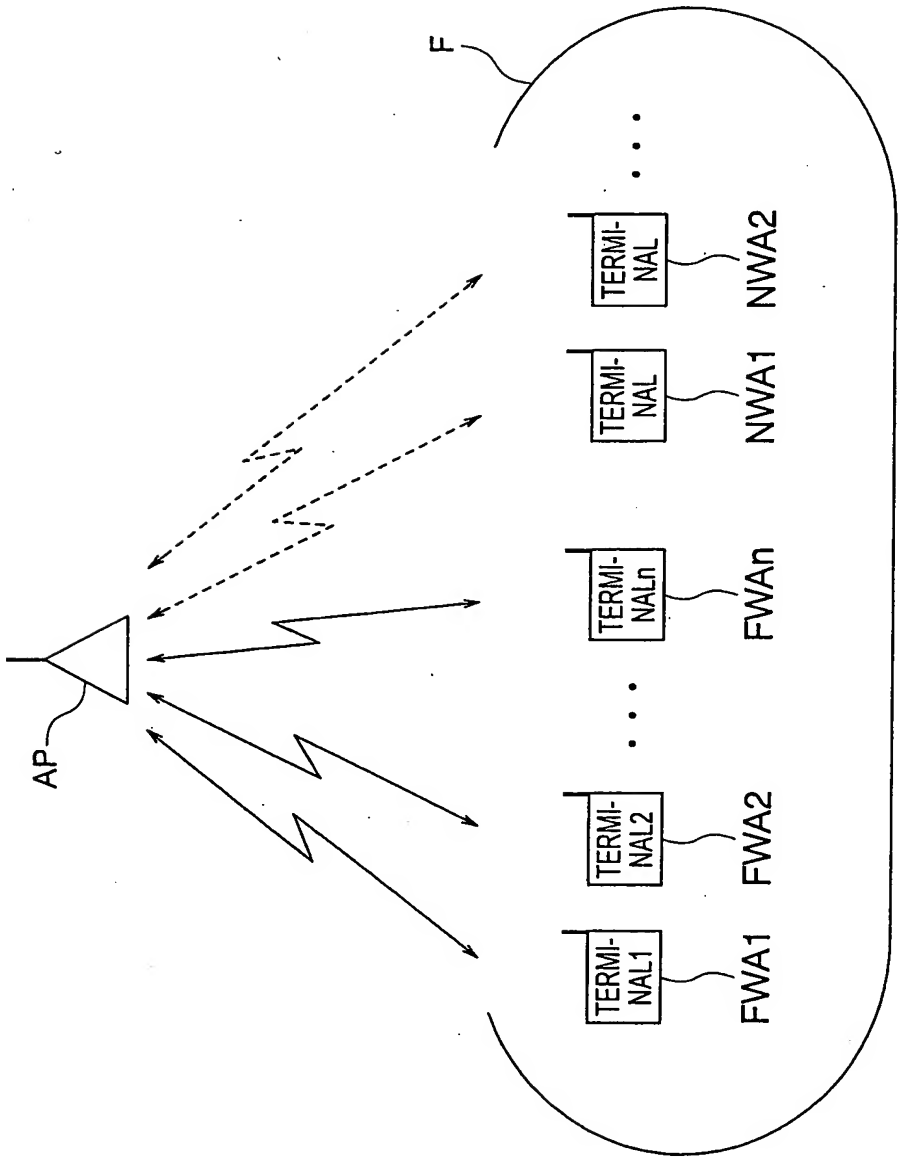
F
AP
TERMI-NAL1
TERMI-NAL2
TERMI-NALn
TERMI-NAL
TERMI-NAL
FWA1
FWA2
FWAn
NWA1
NWA2

FIG. 2

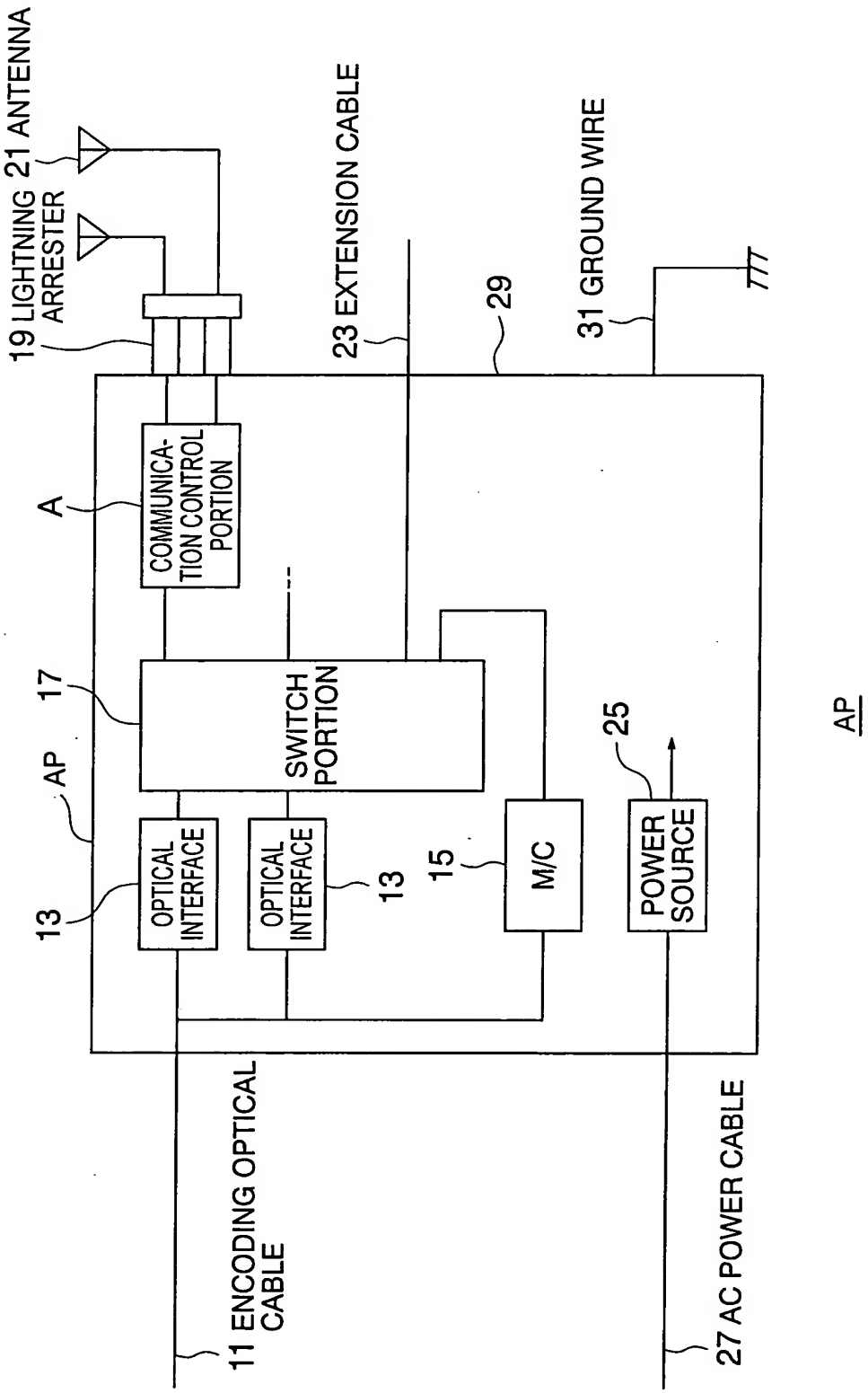
19 LIGHTNING ARRESTER
21 ANTENNA
23 EXTENSION CABLE
29
31 GROUND WIRE
777
A
COMMUNICATION CONTROL PORTION
17
SWITCH PORTION
AP
25
13
OPTICAL INTERFACE
OPTICAL INTERFACE
13
15
M/C
POWER SOURCE
AP
11 ENCODING OPTICAL CABLE
27 AC POWER CABLE

FIG. 3

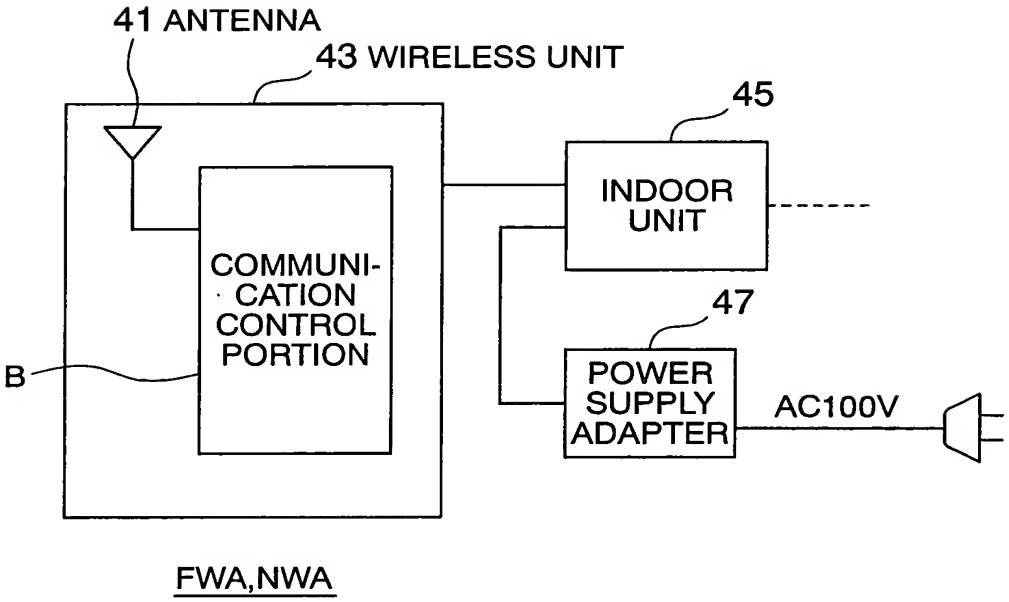
41 ANTENNA
43 WIRELESS UNIT
45
INDOOR UNIT
COMMUNI-CATION CONTROL PORTION
47
POWER SUPPLY ADAPTER
AC100V
B
FWA,NWA

FIG. 4

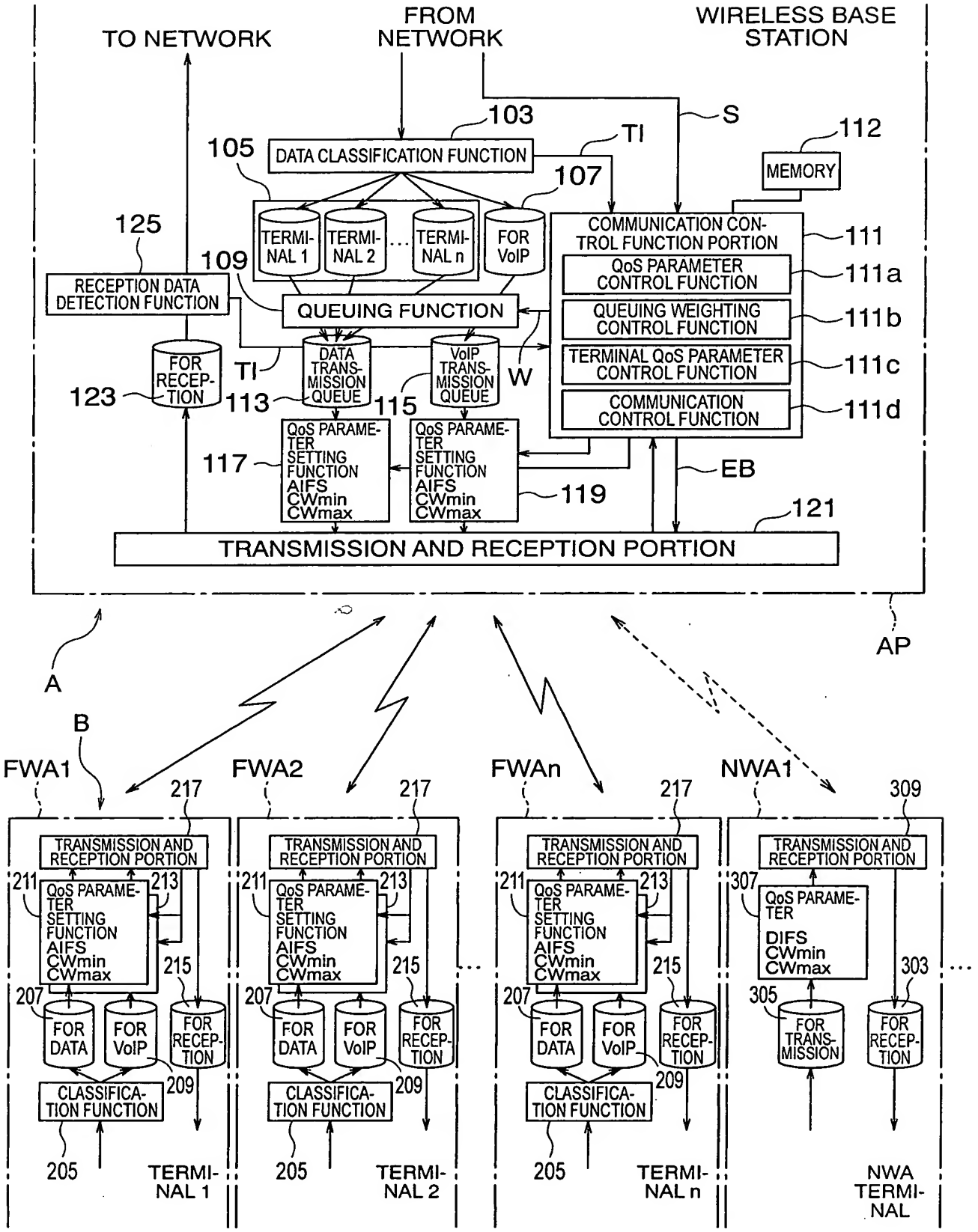
TO NETWORK
FROM NETWORK
WIRELESS BASE STATION
103
S
TI
112
105
DATA CLASSIFICATION FUNCTION
MEMORY
107
125
TERMI-NAL 1
TERMI-NAL 2
TERMI-NAL n
FOR VoIP
COMMUNICATION CON-TROL FUNCTION
111
109
QoS PARAMETER CONTROL FUNCTION
111a
RECEPTION DATA DETECTION FUNCTION
QUEUING FUNCTION
QUEUING WEIGHTING CONTROL FUNCTION
111b
TERMINAL QoS PARAMETER CONTROL FUNCTION
111c
FOR RECEP-TION
TI
DATA TRANS-MISSION QUEUE
VoIP TRANS-MISSION QUEUE
W
COMMUNICATION CONTROL FUNCTION
111d
123
113
115
QoS PARAME-TER SETTING FUNCTION AIFS CWmin CWmax
QoS PARAME-TER SETTING FUNCTION AIFS CWmin CWmax
117
119
EB
121
TRANSMISSION AND RECEPTION PORTION
AP
A
B
FWA1
FWA2
FWAn
NWA1
217
309
TRANSMISSION AND RECEPTION PORTION
211
213
QoS PARAME-TER SETTING FUNCTION AIFS CWmin CWmax
215
207
FOR DATA
FOR VoIP
FOR RECEP-TION
209
CLASSIFICA-TION FUNCTION
205
TERMI-NAL 1
TERMI-NAL 2
TERMI-NAL n
307
QoS PARAME-TER DIFS CWmin CWmax
303
305
FOR TRANS-MISSION
NWA TERMI-NAL

FIG. 5

	PRESENCE OR ABSENCE OF DOWNSTREAM FWA ORDINARY DATA TRANS-MISSION	PRESENCE OR ABSENCE OF UPSTREAM FWA ORDINARY DATA RECEPTION	PRESENCE OR ABSENCE OF DOWNSTREAM NWA DATA TRANSMISSION	PRESENCE OR ABSENCE OF UPSTREAM NWA DATA RECEPTION	PRESENCE OR ABSENCE OF DOWNSTREAM FWA VoIP DATA TRANSMISSION	PRESENCE OR ABSENCE OF UPSTREAM FWA VoIP DATA RECEPTION
WITH TERMINAL 1	○	×	×	×	×	×
WITH TERMINAL 2	○	○	×	×	○	○
WITH TERMINAL 3	×	×	○	○	×	×
⋮	⋮	⋮	⋮	⋮	⋮	⋮
WITH TERMINAL 70	○	×	×	×	○	○
TOTAL (NUMBER OF ○)	3	1	1	1	2	2

FIG. 6

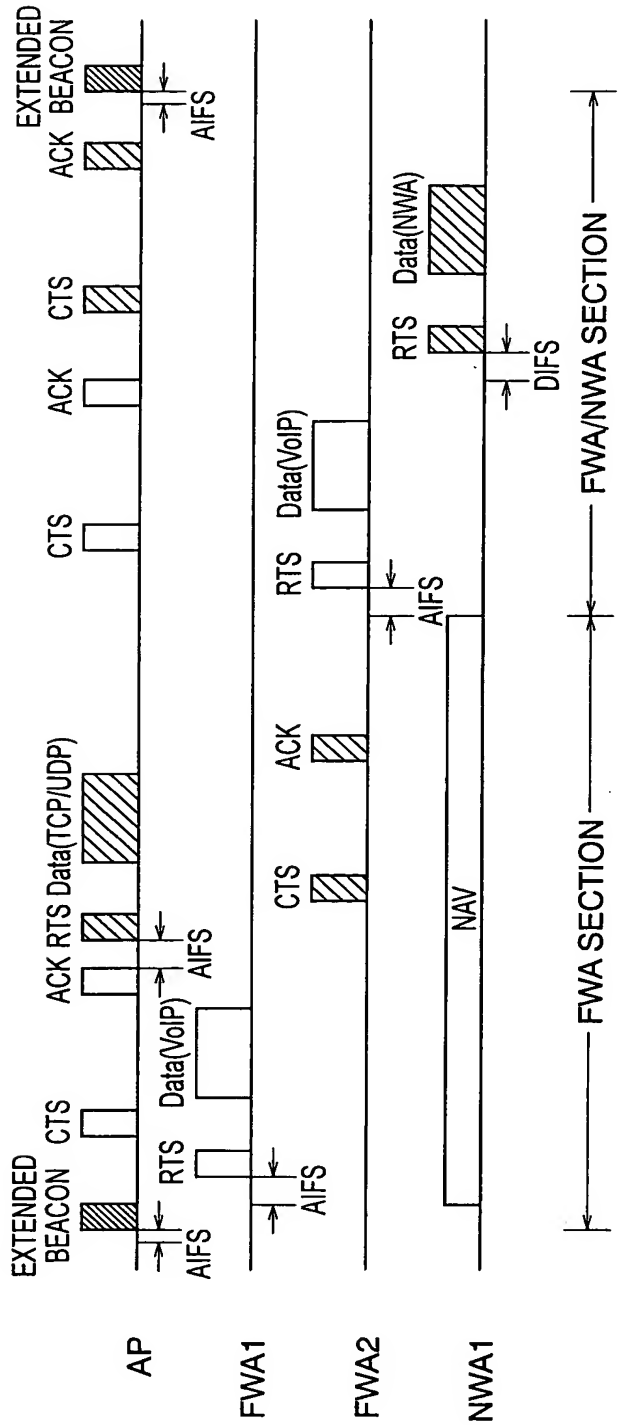
AP
FWA1
FWA2
NWA1
EXTENDED BEACON
AIFS
CTS
RTS
AIFS
Data(VoIP)
ACK
RTS
AIFS
Data(TCP/UDP)
CTS
ACK
CTS
RTS
AIFS
Data(VoIP)
ACK
CTS
NAV
RTS
Data(NWA)
DIFS
EXTENDED BEACON
ACK
FWA SECTION
FWA/NWA SECTION

FIG. 7

NUMBER OF UPSTREAM NWA TERMINALS	NUMBER OF UPSTREAM FWA TERMINALS										
	0	1	2	3	.	.	.	69	70
0	50	98	98	98				98	98
1	2	50	66	75				98	98
2	2	33	50	60					
3	2	25	40	50					
.									
.									
.									
69	2	2							
70	2								

FIG. 8

FWA-SECTION ADJUSTING COEFFICIENT	0: NOT CHANGED 1: FOUR TIMES LENGTH OF FWA SECTION 2: TWICE LENGTH OF FWA SECTION 3: HALF LENGTH OF FWA SECTION 4: ONE-FOURTH LENGTH OF FWA SECTION

FIG. 9

ITEM	FWA TERMINAL VoIP	FWA TERMINAL TCP/UDP	NWA TERMINAL
CWmin	FIXED TO 1 FOR DOWNSTREAM SET LESS THAN 15 FOR UP-STREAM (TO BE DETERMINED BY SIMULATION)	DETERMINED BY SIMULATION FOR UPSTREAM AND DOWN-STREAM	15
CWmax	DETERMINED BY SIMULATION FOR UPSTREAM AND DOWN-STREAM	FIXED TO 1023	FIXED TO 1023
AIFS/DIFS	25μs(=PIFS)	34μs(=DIFS)	34μs(=DIFS)
REMARKS	VARIABLE FOR UPSTREAM ACCORDING TO RATIO OF BASE STATION TO TERMINALS	VARIABLE FOR UPSTREAM ACCORDING TO RATIO OF BASE STATION TO TERMINALS VARIABLE ALSO FOR DOWN-STREAM	FIXED

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FIG. 10

(a)

NUMBER OF UPSTREAM ACTIVE TERMINALS \ NUMBER OF DOWNSTREAM ACTIVE TERMINALS	0-5	6-10	11-20	21-35	36-50	51-60
0-5						
6-10						
11-20						
21-35						
36-50						
51-70				0 TO 5 VoIP TERMINALS		

6 TO 10 VoIP TERMINALS

10 VoIP TERMINALS OR MORE

PARAMETERS

(b)

DATA TYPE	BASE STATION/ TERMINAL	PARAMETER	RANGE
ORDINARY DATA	BASE STATION	CWmin	0～1023
		CWmax	0～1023
		AIFS	0～4
	TERMINAL	CWmin	0～1023
		CWmax	0～1023
		AIFS	0～4
VoIP	BASE STATION	CWmin	0～1023
		CWmax	0～1023
		AIFS	0～4
	TERMINAL	CWmin	0～1023
		CWmax	0～1023
		AIFS	0～4

FIG. 11

ITEM NAME	LENGTH (Bytes)	VALUE	REMARKS
ORDINARY-DATA UPSTREAM INDIVIDUAL TRAFFIC CONTROL COEFFICIENT	2	0-4	0 : NOT CHANGED 1 : FOUR TIMES CWmin 2 : TWICE CWmin 3 : HALF CWmin 4 : ONE-FOURTH CWmin
ORDINARY-DATA DOWN-STREAM INDIVIDUAL TRAFFIC CONTROL COEFFICIENT	2	0-4	0 : NOT CHANGED 1 : ONE-FOURTH WEIGHT OF ROUND ROBIN 2 : HALF WEIGHT OF ROUND ROBIN 3 : TWICE WEIGHT OF ROUND ROBIN 4 : FOUR TIMES WEIGHT OF ROUND ROBIN

Title: WIRELESS LAN COMMUNICATION SYSTEM
Inventors: KATSUMATA et al.
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FIG. 12

TERMINAL NO.	1	2	3	• • •	69	70
TERMINAL AID						
TERMINAL MAC ADDRESS						
ORDINARY DATA DOWNSTREAM CONTROL	0	0	2		3	0

0 : NOT CHANGED
1 : ONE-FOURTH WEIGHT OF ROUND ROBIN
2 : HALF WEIGHT OF ROUND ROBIN
3 : TWICE WEIGHT OF ROUND ROBIN
4 : FOUR TIMES WEIGHT OF ROUND ROBIN (VALUES IN FIGURE ARE EXAMPLES)

Title: WIRELESS LAN COMMUNICATION SYSTEM
Inventors: KATSUMATA et al.
Atty Docket No.: 403563
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FIG. 13

TRANSMISSION RATE [Mpds]	UPSTREAM TRANSMISSION RATE COEFFICIENT	DOWNSTREAM TRANS-MISSION RATE COEFFICIENT
54	0	0
48	0	0
36	0	0
24	2	2
18	2	2
12	1	1
9	1	1
6	1	1
	0 : NOT CHANGED 1 : FOUR TIMES CWmin 2 : TWICE CWmin VALUES 0 TO 2 SHOULD BE ADJUSTED	0 : NOT CHANGED 1 : ONE-FOURTH WEIGHT OF ROUND ROBIN 2 : HALF WEIGHT OF ROUND ROBIN VALUES 0 TO 2 SHOULD BE ADJUSTED

Title: WIRELESS LAN COMMUNICATION SYSTEM
Inventors: KATSUMATA et al.
Atty Docket No.: 403563
Leydig, Voit & Mayer 202-737-6770

FIG. 14

FIELD NAME	LENGTH (Bytes)	VALUE	REMARKS
Element ID	1	50	EXTENDED FWA QoS PARAMETER
Length	1	8	
QoS COMMON TO ALL TERMINALS parameter (ORDINARY DATA)	2		CWmin, CWmax, AIFS
QoS COMMON TO ALL TERMINALS parameter (VoIP DATA)	2		CWmin, CWmax, AIFS

Title: WIRELESS LAN COMMUNICATION SYSTEM
Inventors: KATSUMATA et al.
Atty Docket No.: 403563
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FIG. 15

FIELD NAME	LENGTH (Bytes)	VALUE	REMARKS
Element ID	1	54	TERMINAL-INDIVIDUAL QoS SETTING INFORMATION
Length	1	6	
WHETHER VoIP-ADDED SERVICE CONTRACT IS VALID OR INVALID	2		1 : VoIP-ADDED SERVICE CONTRACT PRESENCE OTHERS : CONTRACT ABSENCE
ORDINARY-DATA UP-STREAM INDIVIDUAL TRAFFIC CONTROL COEFFICIENT	2	0-4	0 : NOT CHANGED 1 : FOUR TIMES CWmin 2 : TWICE CWmin 3 : HALF CWmin 4 : ONE-FOURTH CWmin
ORDINARY-DATA DOWN-STREAM INDIVIDUAL TRAFFIC CONTROL COEFFICIENT	2	0-4	0 : NOT CHANGED 1 : ONE-FOURTH WEIGHT OF ROUND ROBIN 2 : HALF WEIGHT OF ROUND ROBIN 3 : TWICE WEIGHT OF ROUND ROBIN 4 : FOUR TIMES WEIGHT OF ROUND ROBIN
TRANSMISSION TIME EQUALIZATION FUNCTION	2		0 : INVALID OTHERS : VALID

Title: WIRELESS LAN COMMUNICATION SYSTEM
Inventors: KATSUMATA et al.
Atty Docket No.: 403563
Leydig, Voit & Mayer 202-737-6770

FIG. 16

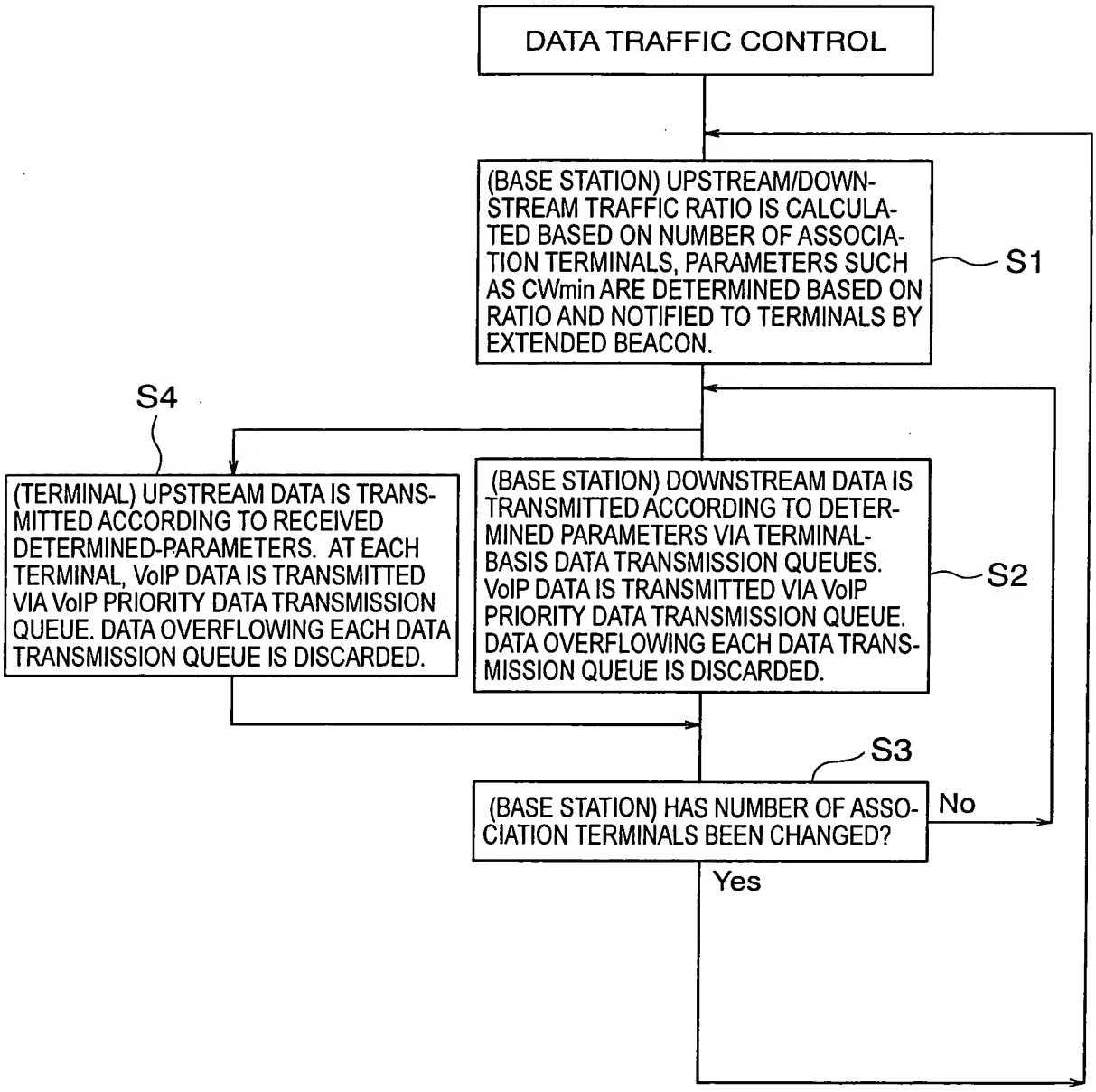

DATA TRAFFIC CONTROL
(BASE STATION) UPSTREAM/DOWN-STREAM TRAFFIC RATIO IS CALCULA-TED BASED ON NUMBER OF ASSOCIA-TION TERMINALS, PARAMETERS SUCH AS CWmin ARE DETERMINED BASED ON RATIO AND NOTIFIED TO TERMINALS BY EXTENDED BEACON.
S1
S4
(TERMINAL) UPSTREAM DATA IS TRANS-MITTED ACCORDING TO RECEIVED DETERMINED-PARAMETERS. AT EACH TERMINAL, VoIP DATA IS TRANSMITTED VIA VoIP PRIORITY DATA TRANSMISSION QUEUE. DATA OVERFLOWING EACH DATA TRANSMISSION QUEUE IS DISCARDED.
(BASE STATION) DOWNSTREAM DATA IS TRANSMITTED ACCORDING TO DETER-MINED PARAMETERS VIA TERMINAL-BASIS DATA TRANSMISSION QUEUES. VoIP DATA IS TRANSMITTED VIA VoIP PRIORITY DATA TRANSMISSION QUEUE. DATA OVERFLOWING EACH DATA TRANS-MISSION QUEUE IS DISCARDED.
S2
S3
(BASE STATION) HAS NUMBER OF ASSO-CIATION TERMINALS BEEN CHANGED?
No
Yes

FIG. 17

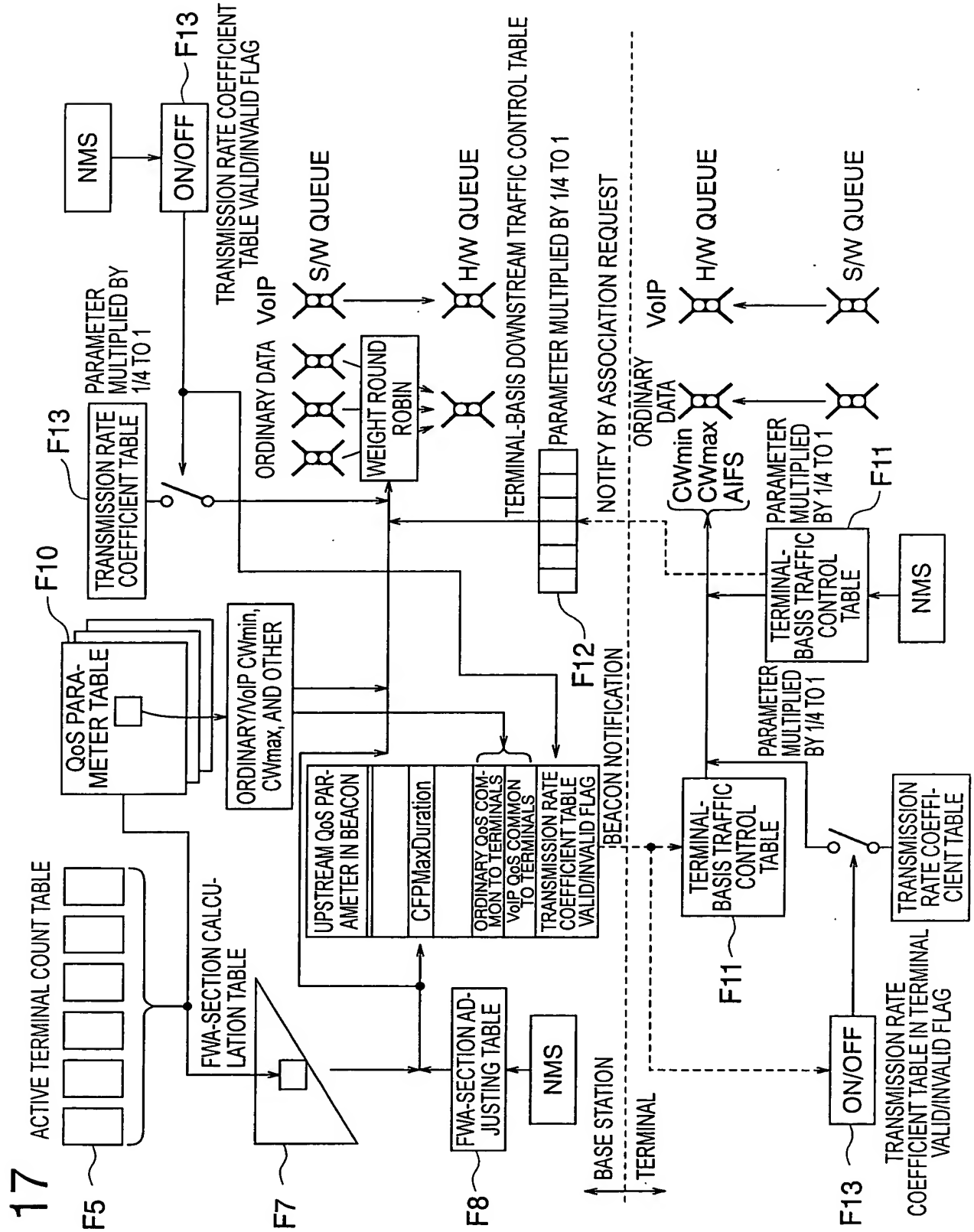

ACTIVE TERMINAL COUNT TABLE
F5
FWA-SECTION CALCU-LATION TABLE
F7
QoS PARA-METER TABLE
F10
ORDINARY/VoIP CWmin, CWmax, AND OTHER
UPSTREAM QoS PAR-AMETER IN BEACON
CFPMaxDuration
ORDINARY QoS COM-MON TO TERMINALS
VoIP QoS COMMON TO TERMINALS
TRANSMISSION RATE COEFFICIENT TABLE VALID/INVALID FLAG
BEACON NOTIFICATION
FWA-SECTION AD-JUSTING TABLE
F8
NMS
BASE STATION
TERMINAL
TRANSMISSION RATE COEFFICIENT TABLE
F13
PARAMETER MULTIPLIED BY 1/4 TO 1
ON/OFF
NMS
TRANSMISSION RATE COEFFICIENT TABLE VALID/INVALID FLAG
ORDINARY DATA
VoIP
S/W QUEUE
WEIGHT ROUND ROBIN
H/W QUEUE
TERMINAL-BASIS DOWNSTREAM TRAFFIC CONTROL TABLE
PARAMETER MULTIPLIED BY 1/4 TO 1
F12
NOTIFY BY ASSOCIATION REQUEST
TERMINAL-BASIS TRAFFIC CONTROL TABLE
F11
ORDINARY DATA
VoIP
CWmin
CWmax
AIFS
H/W QUEUE
S/W QUEUE
PARAMETER MULTIPLIED BY 1/4 TO 1
F11
TERMINAL-BASIS TRAFFIC CONTROL TABLE
NMS
PARAMETER MULTIPLIED BY 1/4 TO 1
TRANSMISSION RATE COEFFI-CIENT TABLE
ON/OFF
F13
TRANSMISSION RATE COEFFICIENT TABLE IN TERMINAL VALID/INVALID FLAG

FIG. 18

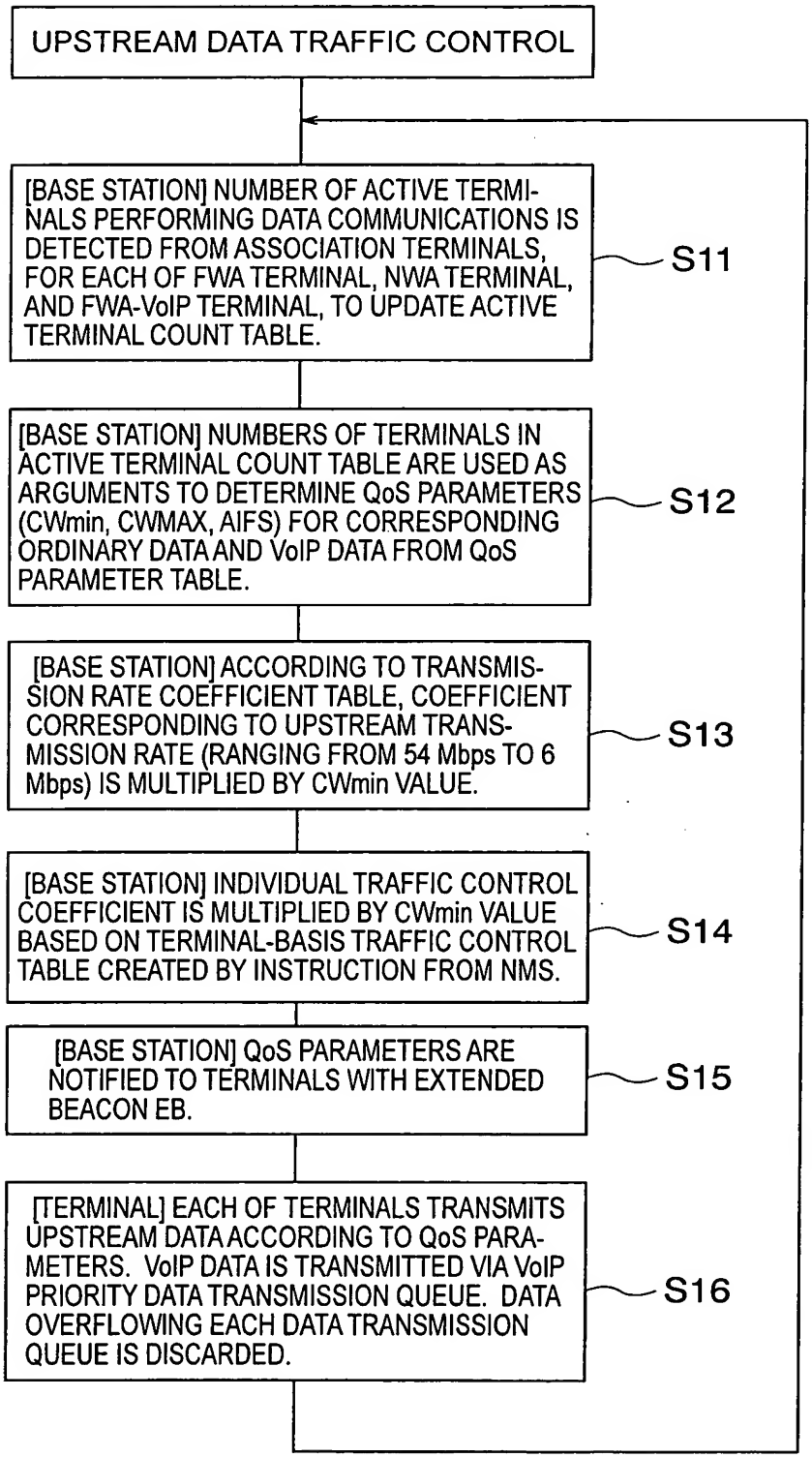

UPSTREAM DATA TRAFFIC CONTROL
[BASE STATION] NUMBER OF ACTIVE TERMINALS PERFORMING DATA COMMUNICATIONS IS DETECTED FROM ASSOCIATION TERMINALS, FOR EACH OF FWA TERMINAL, NWA TERMINAL, AND FWA-VoIP TERMINAL, TO UPDATE ACTIVE TERMINAL COUNT TABLE.
S11
[BASE STATION] NUMBERS OF TERMINALS IN ACTIVE TERMINAL COUNT TABLE ARE USED AS ARGUMENTS TO DETERMINE QoS PARAMETERS (CWmin, CWMAX, AIFS) FOR CORRESPONDING ORDINARY DATA AND VoIP DATA FROM QoS PARAMETER TABLE.
S12
[BASE STATION] ACCORDING TO TRANSMISSION RATE COEFFICIENT TABLE, COEFFICIENT CORRESPONDING TO UPSTREAM TRANSMISSION RATE (RANGING FROM 54 Mbps TO 6 Mbps) IS MULTIPLIED BY CWmin VALUE.
S13
[BASE STATION] INDIVIDUAL TRAFFIC CONTROL COEFFICIENT IS MULTIPLIED BY CWmin VALUE BASED ON TERMINAL-BASIS TRAFFIC CONTROL TABLE CREATED BY INSTRUCTION FROM NMS.
S14
[BASE STATION] QoS PARAMETERS ARE NOTIFIED TO TERMINALS WITH EXTENDED BEACON EB.
S15
[TERMINAL] EACH OF TERMINALS TRANSMITS UPSTREAM DATA ACCORDING TO QoS PARAMETERS. VoIP DATA IS TRANSMITTED VIA VoIP PRIORITY DATA TRANSMISSION QUEUE. DATA OVERFLOWING EACH DATA TRANSMISSION QUEUE IS DISCARDED.
S16

FIG. 19

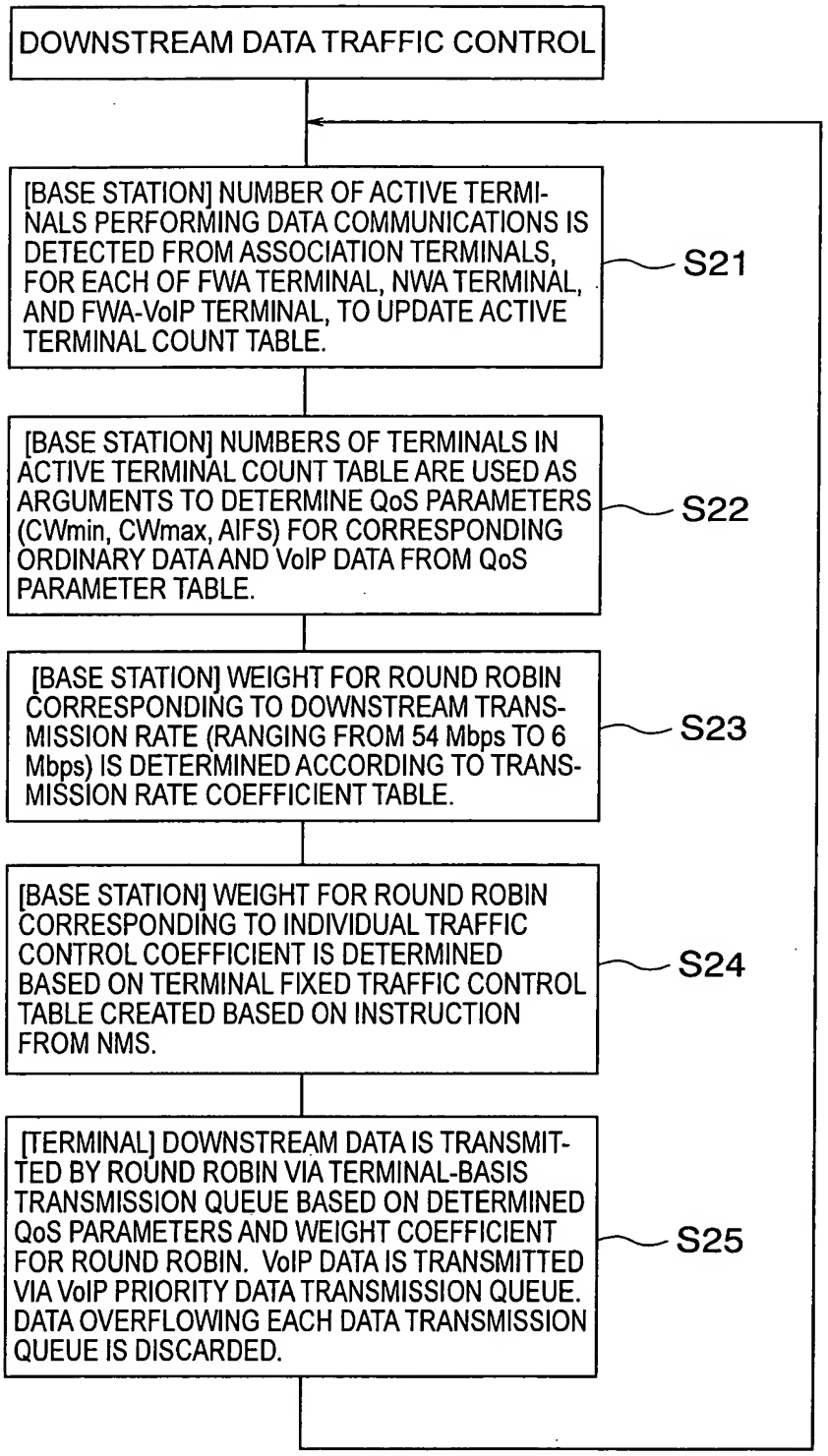
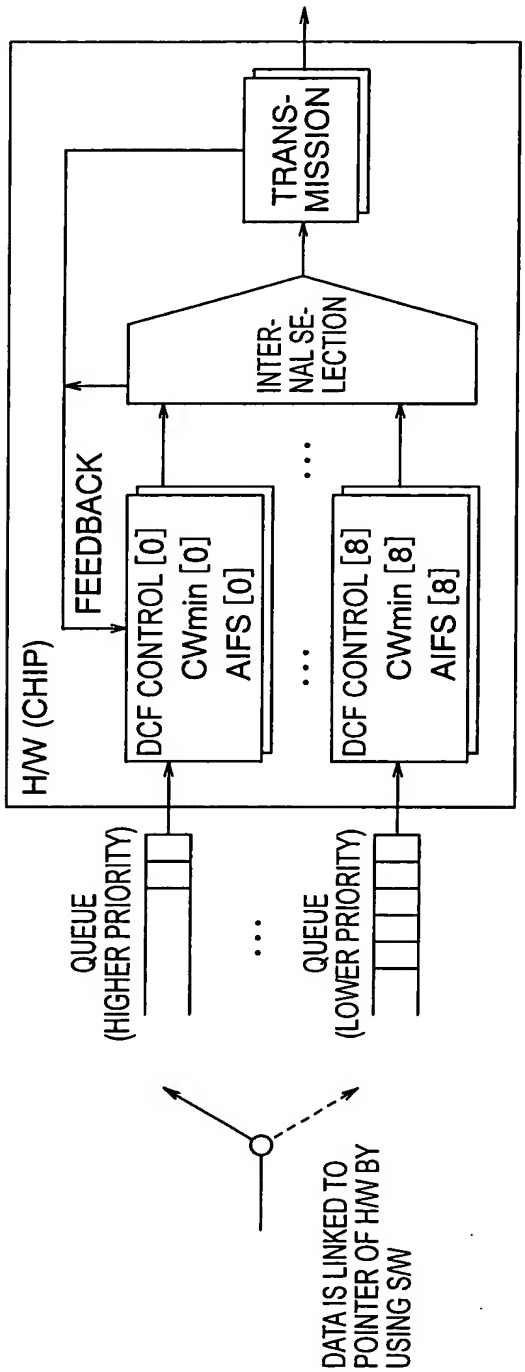

DOWNSTREAM DATA TRAFFIC CONTROL
[BASE STATION] NUMBER OF ACTIVE TERMINALS PERFORMING DATA COMMUNICATIONS IS DETECTED FROM ASSOCIATION TERMINALS, FOR EACH OF FWA TERMINAL, NWA TERMINAL, AND FWA-VoIP TERMINAL, TO UPDATE ACTIVE TERMINAL COUNT TABLE.
S21
[BASE STATION] NUMBERS OF TERMINALS IN ACTIVE TERMINAL COUNT TABLE ARE USED AS ARGUMENTS TO DETERMINE QoS PARAMETERS (CWmin, CWmax, AIFS) FOR CORRESPONDING ORDINARY DATA AND VoIP DATA FROM QoS PARAMETER TABLE.
S22
[BASE STATION] WEIGHT FOR ROUND ROBIN CORRESPONDING TO DOWNSTREAM TRANSMISSION RATE (RANGING FROM 54 Mbps TO 6 Mbps) IS DETERMINED ACCORDING TO TRANSMISSION RATE COEFFICIENT TABLE.
S23
[BASE STATION] WEIGHT FOR ROUND ROBIN CORRESPONDING TO INDIVIDUAL TRAFFIC CONTROL COEFFICIENT IS DETERMINED BASED ON TERMINAL FIXED TRAFFIC CONTROL TABLE CREATED BASED ON INSTRUCTION FROM NMS.
S24
[TERMINAL] DOWNSTREAM DATA IS TRANSMITTED BY ROUND ROBIN VIA TERMINAL-BASIS TRANSMISSION QUEUE BASED ON DETERMINED QoS PARAMETERS AND WEIGHT COEFFICIENT FOR ROUND ROBIN. VoIP DATA IS TRANSMITTED VIA VoIP PRIORITY DATA TRANSMISSION QUEUE. DATA OVERFLOWING EACH DATA TRANSMISSION QUEUE IS DISCARDED.
S25

FIG. 20


H/W (CHIP)
FEEDBACK
DCF CONTROL [0]
CWmin [0]
AIFS [0]
DCF CONTROL [8]
CWmin [8]
AIFS [8]
INTER-NAL SE-LECTION
TRANS-MISSION
QUEUE (HIGHER PRIORITY)
QUEUE (LOWER PRIORITY)
• DATA IS LINKED TO POINTER OF H/W BY USING S/W